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ABSTRACT

This paper examines the educational results of the reunification of East and West Germany. Specifically, it discusses what happened to students' self-concept when the East German system, which was highly standardized, was combined with the West German schools, which were highly differentiated and based on achievement. To study this result, longitudinal data from large cohorts of seventh grade (n=2,778) East and West German students were collected at the start of reunification of the school systems. The prior East German school system was largely transformed into the existing West German system. Multilevel modeling demonstrated the "big fish little pond" effect was more prevalent for West German students than for East German students; that is, students who attended classes where class-average math achievement was higher led to lower math self-concepts. But the difference was smaller by the middle of the year and had disappeared by the end of the first school year after reunification. However, East German students had significantly lower academic self-concepts than did their West German counterparts. The results demonstrate how systemwide educational policies can affect the academic self-concepts of individual students. (Contains 22 references.) (RJM)

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This paper is part of a symposium sponsored by the SELF Research Centre (http://edweb.macarthur.uws.edu.au/self/) at the 2000 Annual Meeting at the American Educational Research Association 1999 (New Orleans, 24 - 27 April, 2000). These data come from the large-scale Learning Processes, Educational Careers and Psychosocial Development in Adolescence (BIJU) project directed by Professor Jürgen Baumert of the Max Planck Institute for Human Development. The present investigation was conducted while Professor Marsh was on a sabbatical leave and was supported in part by the University of Western Sydney, the Max Planck Institute, and the Australian Research Council through a Special Investigator Grant. Correspondence in relation to this study should be sent to Professor Herbert W. Marsh, Faculty of Education, University of Western Sydney, Macarthur, PO Box 555, Campbelltown, NSW 2560 Australia (or via Internet to h.marsh@uws.edu.au), whereas correspondence about the broader BIJU study should be sent to Professor Jürgen Baumert, Max Planck Institute for Human Development, Lentzealle 94, D-14195 Berlin, Germany (or via Internet to sekbaumert@mpib-berlin.mpg.de)

Abstract

Longitudinal data from large cohorts of 7th grade (n=2,778) of East and West German students were collected at the start of the reunification of the school systems to evaluate how this remarkable social experiment effects self-concept formation. Multilevel modeling demonstrated the big fish little pond effect (BFLPE); attending classes where class-average math achievement was higher led to lower math self-concepts. West German students attended schools that were highly stratified in relation to ability before and after the reunification, whereas East German students first attended selective schools after the reunification. Consistent with theoretical predictions based on this difference, the BFLPE – the negative effect of class-average achievement – was more negative in West German schools at the start of the reunification, but this difference was smaller by the middle of the year and had disappeared by the end of the first post-reunification school year. Whereas East and West German results both support the BFLPE, their differences supported theoretical predictions and demonstrated how changes in school policy influences the formation of academic self-concept.

Reunification of East and West German School Systems: Longitudinal Multilevel Modeling Study of the Big Fish Little Pond Effect on Academic Self-concept

According to the social comparison processes that produce the big fish little pond effect (BFLPE), students attending academically selective schools or classes where other students are particularly bright (i.e., selective schools or high ability tracks) are likely to experience lower academic self-concepts than equally able students who are educated in a comprehensive setting. In 1991 East and West German students experienced a remarkable social experiment in which the very different school systems of the former German Democratic Republic (East Germany) and Federal Republic of Germany (West Germany) were reunified. Based on a large scale longitudinal

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project designed to evaluate the implications of the reunification of the two school systems, the present investigation was conducted by the Max Planck Institute for Human Development (see Baumert, et al., 1996; Köller, 1998; Schnabel, 1998).

The former East German system differed from the former West German system and the newly reunified system in two ways that were particularly important for the present investigation of social comparison processes in the formation of academic self-concept. First, the former East German students had explicitly not been grouped into schools or classes according to their achievement levels whereas the former West German students had attended schools based largely on their achievement levels for the two years prior to the reunification of the two systems. Hence, we anticipated that the BFLPE should be initially larger for the West Germans at the start of the first year after the reunification of the two school systems, but that the relative size of the BFLPE should increase more during this first year for East Germans than for West Germans. Second, the former East German system placed considerably more emphasis on highly competitive, social comparison processes that are likely to undermine academic self-concept. Hence, the self-concepts of former East German students should be lower overall than those of the former West German students.

Multidimensional Academic Self-concepts and Frames of Reference

The historical, theoretical underpinnings of this research come from research in psychophysical and social judgment, social psychology, sociology, social comparison theory, and the theory of relative deprivation. According to this theoretical position, equally able students who attend schools in which school-average achievement differs will use correspondingly different frames of reference in evaluating their own academic accomplishments, and that this process will affect academic self-concept and subsequent academic outcomes (Marsh, 1984, 1987, 1990, 1991, 1993). The most clearly established finding from this research is what Marsh (1987, 1991; Marsh & Parker, 1984) referred to as the big-fish-little-pond effect (BFLPE) whereby equally able students have lower academic self-concepts in schools where the average achievement level is higher than in schools where the average achievement level is lower. In the typical demonstration of the BFLPE, school-average ability is negatively related to academic self-concept after controlling for the effects of individual student achievement. Marsh (1990, 1991, 1993) reviewed studies based on a variety of different experimental/analytical approaches in support of the BFLPE.

Consistent with the growing recognition of the multidimensionality of self-concept and the need to distinguish between academic and non-academic components of self-concept (Marsh, Byrne, & Shavelson, 1988; Marsh & Hattie, 1996), the BFLPE is very specific to academic self-concept. Marsh and Parker (1984; Marsh, 1987) showed that there were large BFLPEs for academic self-concept, but little or no BFLPEs on general self-concept or self-esteem. Marsh, Chessor, et al. (1995) reported two studies of the effects of participation in gifted and talented programs on different components of self-concept over time and in relation to a matched comparison group. There was clear evidence for the BFLPE in that academic self-concept in the gifted and talented programs declined over time and in relation to the comparison group. These BFLPEs were consistently large for Math, Verbal, and Academic self-concepts, but were small and largely nonsignificant for four nonacademic self-concepts and for general esteem.

Marsh (1991) found further support for the negative effects of school-average ability on academic self-concept, but sought to determine whether these negative effects of selective schools generalized to other academic outcomes. He greatly expanded the number of outcome variables to include: academic and general self-concept, selection of advanced coursework, academic effort, educational and occupational aspirations, performance on standardized achievement tests collected in the sophomore year and again in the senior years of high school; and college attendance, educational aspirations, and occupational aspirations measured two years after the

normal graduation from high school. The effects of attending higher-ability high schools were negative for almost all the outcomes considered and were not significantly positive for any of the outcomes on any occasion. Furthermore, a substantial proportion of the negative effects of class-average achievement was mediated by the BFLPE on academic self-concept, thus expanding the implications of the BFLPE.

Whereas the results reviewed here clearly support the social comparison perspective underpinning the BFLPE, several unresolved controversies are addressed in the present investigation.

1. Reflected glory assimilation vs. social comparison contrast. Self-concept may be enhanced by membership in groups that are positively valued by an individual (Diener & Fujita, 1997; Tessor, 1988) through basking in the reflected glory of accomplishments or good qualities of other group members. Marsh (1984, 1987, 1991, 1993; also see Felson, 1984) argued that it would be reasonable for students in academically selective classes to have improved academic self-concepts by virtue of being chosen to be in a highly selective educational program -- an assimilation, reflected glory, or labeling effect (e.g., if I am good enough to be selected to participate in this prestigious program with all these other very smart students, then I must be very smart). Alternatively, if students use the other students in their academically selective class as a basis of comparison, then participation in academically selective classes should result in lowered academic self-concepts consistent with the BFLPE--a contrast or social comparison effect (e.g., there are a lot of students better than I am so I must not be as good as I thought). Because academic self-concepts tend to decline in selective settings relative to matched comparison groups, Marsh argued that the contrast effects must be stronger than the assimilation effects. However, the empirically observed BFLPE is likely to represent the counter-balancing, net effects of these two opposing processes. This implies that a reflected glory (assimilation) effect may be operating even though its effects are not so large as the social comparison (contrast) effects, but little research has attempted to disentangle the two effects in BFLPE studies. Furthermore, controlling for the reflected glory effect by including relevant variables in the model should result in even more negative BFLPEs and, perhaps, controlling for the BFLPE should lead to even more positive reflected glory effects.

2. Short-term and long-term effects. There may be temporal differences in the development of the counter-balancing reflected glory (assimilation) and social comparison (contrast) effects. Thus, for example, students who have just learned of their selection into a special academic program may bask in the glory of this accolade without experiencing the need to evaluate themselves in relation to their new classmates who they have not yet met. After starting the new program, however, the relative accomplishments of different students will become more salient with increasing amounts of explicit or implicit performance feedback and social comparison, encouraging students to reestablish their pecking order within this new context. More generally, the time sequence of the BFLPE and whether its effects are short or long term is of practical and theoretical importance. Although limited research is available, Marsh (1991; also see Marsh, Chessor, et al., 1995; Marsh & Rowe, 1996) reported that there were new BFLPEs in the last two years of high school beyond the already negative BFLPEs during initial first high school years and that the effects were also evident in depressed educational aspirations assessed two years after graduation from high school. Hence, the BFLPE appears to grow larger during the time students attend selective schools and to have lasting effects long after leaving selective schools.

Based on theoretical work underpinning the BFLPE, we make the following a priori predictions.

1. The BFLPE, demonstrated primarily in English-speaking countries, will be replicated in both the East and West German samples. More specifically:

a. The BFLPE will be initially smaller for East German students who have not previously experienced selective schools than for West German students who have been in selective schools for the previous two years. However, the size of the difference in BFLPE will decline over time as the East German students experience the highly ability-stratified school system that had already been in place in the West German system.

b. The BFLPE represents the net effect of a larger negative, social-comparison (contrast) effect and a smaller, positive, reflected glory (assimilation) effect. The social comparison effect should be particularly clear in the negative effects of class-average achievement as demonstrated in previous BFLPE studies. However, attending a Gymnasium (high ability track high school) is likely to result in a reflected glory effect because of the high visibility and social status associated with being selected to attend these elite schools. Because the predicted positive effect of attending the Gymnasium is confounded with the predicted negative effect of class-average achievement, the predicted positive effect of attending the Gymnasium should be more evident after controlling for the negative effect of class-average achievement. Similarly, because the predicted negative effect of class-average achievement is confounded with the predicted positive effect of attending a Gymnasium, the social comparison effect of class-average achievement should be more negative after controlling for the positive Gymnasium effect. Hence, when both class-average achievement and Gymnasium are considered simultaneously, there should be a mutual suppression effect such that the effect of class-average achievement will be more negative than when Gymnasium is not included in the analysis and the effect of Gymnasium will be more positive than when class-average achievement is not included in the analysis. These predictions follow from our interpretation of the BFLPE as a joint effect of a large negative social comparison (contrast) effect and a small positive reflected glory (assimilation) effects. Furthermore, controlling for the reflected glory effects will provide a more accurate estimate of the BFLPE that is less biased by reflected-glory effects than in previous research.

2. Due to the highly competitive nature of the former East German system with its heavy emphasis on social comparison, self-concepts will initially be lower in this sector (see Covington, 1992; Marsh & Peart, 1988; Marshall & Weinstein, 1984), but the differences between students from the two systems will decrease over time after the reunification.

Method

Data

The empirical basis for our investigation was a subsample of the longitudinal study Learning Processes, Educational Careers and Psychosocial Development in Adolescence (BIJU). A total of n = 3,787 7th graders (mean age M = 13.4 years) were tested at three measurement points (at the beginning, in the middle, and at the end of the 1991/92 school). For purposes of the present investigation, consideration was limited to students who had complete data for all three time points and to classes that were represented by responses from at least 10 students, resulting in a total sample of 2,778 students and 161 classrooms.

Measures

Math self-concept was measured by means of a 4-item scale that was shown to be reliable for each of three occasions (all coefficient alphas > .8). Three waves of self-concept data were considered, at the start of 7th grade (T1), at the middle of 7th grade (T2), and at the end of 7th grade (T3). A total of 30 math achievement items were derived from prior research. The test covered different content areas, was judged to have curricular validity by different curriculum experts, and was reliable (rxx = .81).

Statistical Analysis

In most school settings, individual student characteristics and those associated with classrooms or schools are confounded because individuals are not randomly assigned to groups. This clustering effect introduces problems related to appropriate levels of analysis, aggregation bias, heterogeneity of regression, and associated problems of model misspecification due to lack of independence between measurements at different levels. A detailed presentation of the conduct of multilevel modeling (also referred to as hierarchical linear modeling) is available elsewhere (e.g., Bryk & Raudenbush, 1992; Goldstein, 1995; Hill & Rowe, 1996). Of particular importance to the present investigation, the meaning of a variable at the student level may not bear any straightforward relation to its meaning at the classroom. The BFLPE represents a dramatic example of this problem in that achievement at the individual student level is positively related to academic self-concept whereas achievement at the school- or class-average level is negatively related to academic self-concept. The juxtaposition between the effects of individual achievement and class-average achievement is inherently a multilevel issue that cannot be represented adequately at either the individual student or the classroom level. Particularly when major variables of concern represent different levels, it is important to analyze data with appropriate multilevel statistical procedures. In this study we demonstrate two alternative multilevel modeling approaches -- path analysis models and growth models -- to relating variables representing different levels of measurement (e.g., individual students and classrooms) and growth over time. More specifically, we tested two-level models of self-concept at each occasion, two-level models of self-concept change (self-concept at one occasion, controlling for self-concept from an earlier occasion), and a three-level growth model. These models are described in more detail in the Appendix. The critical characteristic common to all these models is that predictors at the individual student level are allowed to vary systematically at the class level.

Particularly in multilevel models, it is useful to transform variables so as to facilitate interpretations. Following Marsh and Rowe (1996) we began by standardizing (z-scoring) all non-repeated variables (i.e., all but the T1, T2, and T3 self-concepts), including dichotomous variables, to have M = 0, SD = 1 across the entire sample. T1, T2, and T3 self-concepts were standardized in terms of the mean and standard deviation of T1 self-concept so that change in self-concept over time was not lost through standardization. Class-average variables (e.g., class-average achievement) were the class-average means of individual (z-score) standardized variables (and were not re-standardized). Product terms were the product of individual (z-score) standardized variables (and were not re-standardized). Coefficients for the polynomial growth components in the three-level growth model were orthonormalized so that the sum of the squared coefficients summed to 1.0. Particularly the two-level models can be viewed as multilevel path analyses. For the three-level growth model, because there were only three measurement occasions, one of the three polynomial terms (intercept, linear growth, quadratic growth) had to be fixed (i.e., did not have a residual variance term) in order for the model to be identified. Also, because of the potentially very large number of parameter estimates and problems of multicolinearity (since many of the explanatory variables were correlated), we adopted a backwards elimination process in which parameter estimates with the highest p-values > .7 (i.e., the "least statistically significant" parameter estimates) were eliminated one at a time with the exception of parameter estimates that were of central importance for evaluating a priori hypotheses. Implications of this process are discussed further as part of the presentation of the results.

Results

The BFLPE in the present investigation is represented by the negative effect of class average achievement after controlling for individual achievement. Two approaches, both based on multilevel modeling, were used to assess this effect in the present investigation. The purposes of both approaches are to determine the size of the BFLPE, whether these effects are different for East and West German students, how the size of this difference varies over time during the first year of the reunification of the East and West German school systems, and how it is influenced by

the tracking system (attending a Gymnasium) in German schools. The first approach is based on a multilevel analogue to traditional path analysis (see Figure 1) in which a series of increasingly complex models are tested. The critical aspect of this approach is that it allows the researcher to incorporate appropriately constructs measured at both the individual student level (e.g., individual achievement and self-concept) and at the class-average level (e.g., class-average achievement). In the second approach we employ growth modeling in which polynomial trend components of individual student growth in self-concept over the three time points is modeled within each class, aggregated across students within each class, and related to class characteristics. Both approaches provide alternative perspectives of the same phenomena.

Insert Figure 1 About Here

BFLPE, East-West Differences, and Changes Over Time: A Two-Level (Path Analysis) Approach

We begin by evaluating the effects of the major substantive constructs (individual student achievement, class-average achievement, region (East vs. West Germany), and Gymnasium) on math self-concept separately at each occasion. Then we evaluate T2 self-concept controlling for T1 self-concept and T3 self-concept controlling for T1 and/or T2 self-concept in order to evaluate how change in self-concept over time is related to our substantive constructs.

Insert Table 1 About Here

Effects on T1, T2, and T3 Self-concept (Each Considered Separately). The most basic test of the BFLPE consists of an evaluation of the combined effects of individual achievement and class-average achievement on T1 math self-concept (Model 1 in Table 1). Social comparison theory predicts that the effect of class-average achievement should be negative (i.e., the BFLPE). Individual student achievement based on a standardized mathematics test has a positive effect on math self-concept (standardized path coefficient of .34) whereas class-average math achievement has a negative effect on math self-concept (-.17). The same analysis was conducted with the dichotomous Gymnasium (attending a selective school) variable instead of class-average achievement (Model 2 in Table 1). Whereas the pattern of effects is similar, the significantly negative effect of attending the Gymnasium on academic self-concept (-.06) is much smaller. This follows, in part, because the dichotomous Gymnasium variable provides only a crude representation of class-average achievement differences (i.e., initial ability levels of students in the Gymnasium section are higher). This result, however, is also consistent with our supposition that the effect of Gymnasium -- more than class-average achievement -- represents a reflected glory effect.

In Model 3 (Table 1), the effects of both the Gymnasium and class-average achievement are included. Again consistent with a priori predictions, the negative effect of class-average achievement (the BFLPE) is increased by the inclusion of Gymnasium (from -.17 to -.22), whereas the previously negative effect of Gymnasium becomes positive (from -.06 to +.05). This pattern is interesting because typically the effect of a given variable is expected to be smaller and in the same direction when another variable with which it is positively correlated is included in the model. Hence, this is an example of mutual suppression effects. Consistent with our predictions, we interpret these results to indicate that both the Gymnasium and class-average achievement effects represent the net effects of a substantial BFLPE and a smaller reflected glory effect, but that reflected glory effect is more substantial in the Gymnasium sector because of the widely accepted social status accorded to this school type in Germany. Hence, controlling for the reflected glory effect in the Gymnasium variable actually increased -- not decreased -- the negative BFLPE associated with class-average achievement. Controlling the negative BFLPE in the Gymnasium (by controlling class-average achievement) resulted in a stronger, more positive reflected glory effect associated with the Gymnasium (Whereas the positive effect of the Gymnasium in Model 3

is not statistically significant, the shift from the significantly negative in Model 2 to the positive effect in Model 3 is statistically significant.). These results, then, provide preliminary support for the proposal that the BFLPE represents the net effect of a social comparison (contrast effect) and a reflected glory (assimilation) effect, and that controlling for the reflected glory effect increases the size of the observed BFLPE.

Region (East vs. West Germany) is first introduced in Model 4 (Table 1) and is a central variable in terms of evaluating the effects of this critical social experiment--the reunification of the two former school systems--on the formation of self-concept. Consistent with predictions based on school policies emphasizing social comparison and a unitary system in the former East German school system, East German T1 math self-concepts (in the first month of the newly reunified school system) were significantly lower than those of West German students (-.11). Furthermore, also consistent with a priori predictions, there was a statistically significant interaction between region and class-average achievement; the BFLPE at the start of the first year after the reunification of the two school systems was more negative for West German students (who had already been tracked according to achievement in the previous two years) than for East German students (who were attending academically differentiated schools for the first time). In summary, there are both main and interaction effects associated with Region. Overall, initial levels of self-concept are lower in East Germany (the main effect). However, the negative effect of class-average achievement on self-concept is smaller for East German students (the interaction effect). The BFLPE is smaller for East German students at T1.

Models 5 and 6 are similar to Model 4, except that the dependent variable is T2 math self-concept (Model 5) and T3 math self-concept (Model 6). Because the patterns of statistically significant and nonsignificant effects are mostly similar with those in Model 4 (except for the intercept and regions x class-average achievement interaction terms), discussion of the effects are not repeated (but see Table 1). Of particular relevance in these analyses, the size of the BFLPE (the negative effect of class-average achievement) is essentially the same at T1, T2, and T3 (-.18, -.19, and -.19 respectively). Because the results were based on separate self-concept measures collected at the start, in the middle, and near the end of the school year, these results provide a very strong replication of the basic pattern of results.

There is a substantively important change over time in the pattern of statistically significant effects for the region x class-average interaction (see Models 4, 5 and 6 in Table 1). At T1 and, to a slightly lesser extent at T2, the negative effect of class-average achievement is more negative for West German students than for East German students. This is consistent with a priori predictions, because East Germans came from a system in which there was a strong policy against tracking students into schools or classes according to ability grouping, whereas for the previous two years West Germans in this sample had attended schools that were designed to differ substantially in terms of ability. In contrast to T1 and T2 but still consistent with a priori predictions, the region x class-average achievement interaction is not statistically significant at T3. This implies that by the end of the school year the frame of reference effects associated with the newly reunified school system over-shadowed those associated with the former East German system, at least in terms of the BFLPE. Also, there appears to be a decline in the negative effect of region that is again consistent with a priori predictions based on differences between the two systems. The effects of region, however, are statistically positive at each occasion and the observation that there is a decline in this effect should also be interpreted cautiously.

Effects on changes in self-concept over time. In Models 7, 8 and 9 the effects of T1 and/or T2 self-concept are added to the models so that the dependent measure can be interpreted as a measure of change; subsequent self-concept controlled for the effects of prior self-concept. From this perspective, it is not surprising that the effects (except, of course, for prior self-concept) are consistently much smaller and mostly nonsignificant in these models. Thus, for example,

whereas the effects of class-average achievement are still negative, they are nonsignificant in each of these models. This implies that whereas the size of the BFLPE is certainly not diminishing over time, there are not statistically significant new effects that are beyond those that can be explained in terms of T1 math self-concept. Similarly, because the effects of region are nonsignificant in each of these models, there is no support for the suggestion that the apparent decline in the size of this effect over time is statistically significant.

Discussion

History may view the reunification of East and West Germany as one of the most important social interventions in the latter part of the 20th century, and these effects were particularly profound for the German education system. Two differences in the East and West German school systems were central to this study. First, the East German system was based on a unitary design in which all aspects of the educational system were highly standardized, whereas the West German system was highly differentiated. More specifically, there was no tracking of students into different classes or schools according to achievement level in the East German system, whereas West German students were highly stratified into three broad tracks or school types based largely on achievement levels at the end of grade 4 – two years prior to the participation in this study in grade 7. Second, the East German system placed a strong emphasis on highly public, detailed performance feedback from a very young age in order to encourage students' accurate self-assessments, whereas this social comparison was not emphasized in the West German system. Based on these fundamental differences and theoretical self-concept research, we predicted what differences in the formation of academic self-concept would exist at the onset of the intervention and how these differences would change over the first year of the reunification of the two systems into a single system based primarily on the West German system.

Big-Fish-Little Pond Effect.

Social comparison/contrast effects. The first and most central prediction was supported in that the BFLPE – the negative effect of class-average achievement – was clearly evident. The two-level model (Table 1) showed that class-average achievement had negative effects on math self-concept at T1 (-.18), T2 (-.19), and T3 (-.19). These results replicate a growing body of research reviewed earlier, based primarily on research conducted in English-speaking countries, showing that attending academically selective educational programs has a negative effect on academic self-concept.

In an important extension of previous research, we predicted how the BFLPEs would differ in the East and West German cohorts, the two groups in this large-scale social intervention. Consistent with predictions based on theory and the history of selective schooling in East and West Germany, the BFLPE was significantly bigger for West than East German students at the start of the reunification (T1) . Importantly, also consistent with predictions, the size of this difference was significantly smaller by the middle of the school year and had disappeared completely by the end of the first year of the reunified school systems (T3). The critical difference in the former systems leading to this prediction was that the East German students had not previously been tracked according to achievement prior to the reunification whereas the West German students had already been in a highly streamed system for two years.

The collection of data at three points during the first year following the reunification was important, in that it showed the development of the BFLPE in the East German schools was gradual over the first year following the reunification. Also, collection of T1 data in the first week of school in the newly reunified school was important in establishing baseline data. The strength of the development of the BFLPE was evident in that there was no difference in the size of the BFLPE in the former East and West German schools by the end of the year.

Assimilation/reflected glory effects. There is less clear cut support for our predictions about the counter-balancing of the reflected glory (assimilation) effect and social comparison (contrast) effects. The best support comes from the juxtaposition of Models 1, 2, and 3 (Table 1). When Gymnasium and class-average achievement are considered in separate models, each effect is significantly negative, although the class-average achievement effect is more negative (-.17 vs. -.06). This provides some support for our supposition that the relative strength of the reflected glory effect would be stronger for Gymnasium than for class-average achievement. The particularly interesting aspect of these results is, however, when both effects are considered in the same model (Model 3). Because these two effects are substantially correlated, one might normally expect that their effects would overlap so that the unique effects of each would diminish. In fact, the negative effect of class-average achievement is even more negative when Gymnasium is included in the model. Even more interesting, whereas the Gymnasium effect by itself was negative, its effect in combination with class-average achievement became positive. By itself, the effect of Gymnasium is significantly negative because it is confounded with class-average achievement such that the BFLPE component of this net effect is stronger than the reflected glory component of the effect. When the BFLPE component of the Gymnasium effect is controlled by the inclusion of class-average achievement in the model, Gymnasium more clearly represents a positive reflected glory effect. Whereas the pattern of results is clearly consistent with our predictions, the sizes of the effects are not large. In summary, we interpret the results as supportive of our theoretical predictions about the counter-balancing effects of the BFLPE and reflected glory effects, but also emphasize that this is an area that needs more theoretical and empirical research based on more direct measures of reflected glory.

Mean Self-concept Levels in East and West German Students.

The second prediction is that mean levels of self-concept should be lower for East German than West German students. The extreme emphasis on social comparison, normative feedback and competition in the East German system led us to predict that initial levels of self-concept would be lower for East Germans – particularly at T1, the start of the reunification process. The results provided clear support for this prediction. The path models all showed that East Germans had lower self-concepts at T1, T2, and T3 (-.11, -.10, and -.07) than West German students. We were, however, somewhat surprised at the stability of this difference. A possible explanation is that the two school systems did not change as much in relation to this feature of school climate following the reunification as we anticipated. Because this change was not a structural change per se, it may be that the impact of the reunification was so gradual that one year was too soon to see significant changes. In support of this interpretation East German students reported that the nature of their classes at T3 was significantly more competitive than West German students by nearly .19 SD ($t(159) = 2.36$, $p = .018$, based on class-average responses). These supplemental results support our suggestions that the East German system was substantially more competitive so that the reunification had not yet eliminated this difference by the end of the first year.

Methodological Issues

Multilevel modeling demonstrated here offers important advantages over the methodology used in most previous research in this area (e.g., Marsh, 1991). The juxtaposition between the effects of individual achievement and class-average achievement is inherently a multilevel problem and any attempt to model the data at a single level is likely to cause problems. Traditional (ordinary least squares) multiple regression approaches are likely to give biased parameter estimates unless highly restrictive assumptions are met and, even if the parameter estimates are not biased, the standard errors used to assess the statistical significance are likely to be negatively biased (in the direction of showing statistical significance).

One approach to this problem (e.g., Marsh, 1991) has been to compensate for the likely bias by using a design effect estimated from a variety of different indicators that effectively reduces the N

used in statistical significance tests or to merely use a conservative N that one argues to be adequate. Whereas this is better than ignoring the problem, this "one correction fits all variables" approach is unlikely to provide a very good correction for any particular variable, let alone the set of variables used in a particular study. Whereas multilevel modeling is clearly relevant for studies of the BFLPE, it is also relevant in nearly all educational research in which students are clustered into classes. Whereas the added complexity of such analyses will continue to detract from their attractiveness, software packages are becoming more user-friendly and good examples of this research are becoming more common in many substantive areas.

Summary and Implications

We explored the juxtaposition of the assimilation and contrast effects in a large-scale, naturally occurring quasi-experimental study; the reunification of the East and West German school systems following the fall of the Berlin wall. Prior to the reunification, East Germany had a strong policy against ability grouping at either the school or individual classroom level. In West Germany, students generally entered one of the three types of secondary schools at the end of four years of schooling and the elite Gymnasium (high track school) students received a more academic curriculum, attended school for more years, and were expected to go to university. In the reunified system, the prior East German school system was largely transformed into the existing West German system. At time 1, the start of the first school year after the reunification, the East German students had not previously experienced selective schools whereas the West German students had attended achievement-segregated schools for the previous two years. Consistent with this difference, the BFLPE was initially much larger for former West German students compared to East German students, but the difference was smaller by the middle of the year and had disappeared by the end of the first school year after the reunification.

There was also, however, some weak evidence of a positive reflected glory assimilation effect of attending a Gymnasium in addition to the negative social comparison (contrast) effect of school-average ability that was consistent with a priori predictions. Although the results are supportive of theoretical predictions about the counter-balancing effects of the social comparison and reflected glory effects, there is need for further research based on more direct measures of reflected glory.

Finally, consistent with the strong emphasis on competition and social comparison processes in the former East German system, East German students had significantly lower academic self-concepts than did their West German counterparts.

The results are important in replicating a growing body of research from primarily English-speaking schools and extending this research by showing how the effects vary in two groups (East and West German students) in a large-scale, quasi-experimental study. The results also demonstrate how system-wide educational policy differences at the system level can impact the academic self-concepts of individual students.

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Table 1

Path Coefficients Relating Self-concept at T1, T2 and T3 To Achievement, Class-Average Achievement, Gymnasium, Track, East and Prior Self-concept

Outcomes:	T1 Math Self-Concept (T1MSC)				T2MSC	T3MSC	T2MSC (Change)	T3MSC (Change)	
Predictors	Model1	Model2	Model3	Model4	Model5	Model6	Model7	Model8	Model9
Fixed Effects	Coeff p	Coeff p	Coeff p	Coeff p	Coeff p	Coeff p	Coeff p	Coeff p	Coeff
Individ Ach (IAch)	.34 .00	.27 .00	.34 .00	.34 .00	.32 .00	.30 .00	.10 .00	.13 .00	.08 .00
Mean Achieve (MAch)	-.17 .00		-.22 .00	-.18 .01	-.19 .01	-.19 .02	-.06 .25	-.10 .15	-.06 .31
Gymnasium(Gym)		-.06 .04	.05 .30	.05 .27	.02 .73	.04 .48	-.01 .31	.02 .65	.02 .60
East				-.11 .00	-.10 .00	-.07 .03	-.03 .13	-.01 .57	.00 .97
East x MAch				.11 .01	.10 .01	.03 .56	.04 .23	-.03 .44	-.04 .24
Gymx MAch				-.03 .71	-.12 .11	-.10 .28	-.07 .24	-.06 .36	-.04 .55
IA x MAch				-.02 .58	.01 .99	.05 .14	.01 .77	.07 .04	.07 .03
T1Math SC (T1MSC)							.62 .00	.51 .00	.26 .00
T2MSC									.41 .00
Intercept	.00 .95	.00 .90	.00 .95	.00 .96	.09 .04	-.14 .01	.09 .01	-.15 .00	-.19 .00
Random Effects	VComp p	VComp p	VComp p	VComp p	VComp p	VComp p	VCom p	VCmp p	VCom p
IAch	.01 .11	.01 .11	.01 .11	.02 .01	.00 .29	.01 .43	.01 .50	.00 .48	.01 .37
T1MSC							.04 .00	.02 .01	.03 .00
T2MSC									.03 .00
Intercept	.07 .00	.07 .00	.07 .00	.06 .00	.04 .00	.07 .00	.01 .20	.05 .00	.04 .00
Residual	.85	.85	.85	.84	1.08	1.07	.74	.85	.71

Note. East (1 = East, 0 = West). Gym = Gymnasium (1 = yes, 0 = no). VComp variance component. p = p-value. All values are presented in standardized form. For a more detailed description of the two-level model actually tested, see Appendix 1A.

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Figure Caption

Figure 1. The two-level (path analysis) model approach. In Model 4 the effects of 7 independent variables on T1 self-concept were evaluated (parallel models were used for T2 and T3 self-concept). The effects of the 7 independent variables are total effects in that intervening variables were not included in the model. In Model 9 T3 self-concept is the dependent variable and the effects of 7 independent variables, T1 self-concept, and T2 self-concept are evaluated. Because the effects of T1 and T2 self-concept are controlled, the effect of the 7 independent variables on T3 self-concept are direct effects (total effects include those indirect effects that are mediated through T1 and T2 self-concept). Also, because the dependent variable is T3 self-concept controlling for T1 and T2 self-concept, the Model 9 is a model of self-concept change and the direct effects of the 7 independent variables reflect effects on T3 self-concept in addition to the effect of these variables on T1 and T2 self-concept.